

**DYNAMIC SITE PERIODS IN THE NORTHERN MISSISSIPPI EMBAYMENT  
AREA OF WESTERN KENTUCKY AND SOUTHEASTERN MISSOURI**

**Award Number: 1434-HQ-96-GR-02757**

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**Element II  
Ground Motion, Amplification**

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**ABSTRACT**

The objectives of this study were to obtain shear-wave velocities of the near-surface (typically  $\leq 150$  m) soils at sites throughout the Upper Mississippi Embayment, classify the sites in accordance with the 1977 NEHRP recommended provisions regarding soils (Section 4.1.2.1), and to determine the one-dimensional response of the near-surface soils using SHAKE (Schnabel et al., 1972). The shear-wave velocities of the near-surface soils at 366 sites in western Kentucky, southeastern Missouri, northeastern Arkansas, and western Tennessee have been determined using conventional seismic refraction and reflection techniques. Weighted shear-wave velocities, calculated in accordance with Section 4.1.2.3 of the 1977 NEHRP recommended provisions have been calculated using the first-break arrival times and the intercept method. The one-dimensional response of the near-surface soils have been estimated and are shown for a suite of sites across northeastern Arkansas along a latitude of  $35.5^\circ$ .

## DYNAMIC SITE PERIODS IN THE NORTHERN MISSISSIPPI EMBAYMENT AREA OF WESTERN KENTUCKY AND SOUTHEASTERN MISSOURI

### Investigations Undertaken

Shear-wave walkaway and reversed profiles were acquired at nearly 400 sites throughout the northern Mississippi Embayment area in western Kentucky, southeastern Missouri, western Tennessee, and northeastern Arkansas. The objective of collecting these data is to classify sites throughout the area in accordance with the 1997 NEHRP *Recommended Provisions for Seismic Regulations for New Buildings* by providing shear-wave velocities of the near-surface ( $\leq 30$  m or 100 ft) soils.

Given the relatively high probability of a moderately damaging earthquake as opposed to the probability of a major earthquake occurring in the area, input to building codes and seismic hazard mitigation efforts in the area are most generally aimed at reducing losses to what Holzer (1994) refers to as enhanced ground shaking. Building homes, modest retail offices, and industrial structures in the area to withstand the effects of a major earthquake, such as catastrophic ground failure, is beyond the economic resources of most communities. Consequently, the results of this study are seen as addressing the practical needs of what is, for the most part, a rural area of widely scattered small communities.

This study does not address the issues of near-surface soil conditions or the shear-wave velocities of the deeper soils and bedrock in the Memphis metropolitan area. Those issues are being addressed in separate and more detailed studies jointly undertaken by a number of investigators.

### Results

Figure 1 indicates the locations of the sites where SH-wave data have been acquired in this study. SH-wave data at the sites were collected using a seismic hammer, and 12-, 24-, and 48-channel engineering seismographs. The geophone/shotpoint geometries used in the study are illustrated in Figure 2. Tables I through III give the locations of the sites investigated in Arkansas, Missouri, and Tennessee. Included in the tables are the geophone/shotpoint geometries used, our interpretations of the travel-times of the refraction arrivals, and the weighted shear-wave velocities ( $V_s$ ) of the near-surface soils. The weighted shear-wave velocities were calculated in accordance with 1977 NEHRP provisions (pg. 35; eq. 4.1.2.3-1). Since most of the data were acquired with seismic takeout-lines having takeouts at 20 ft intervals, most of the weighted shear-wave velocities are given in terms of ft/s to preserve significant numbers.

The shear-wave data were processed on PC's using the VISTA7.0 (Seismic Image Software Ltd., 1995) software package. Processed data for those sites in Arkansas,

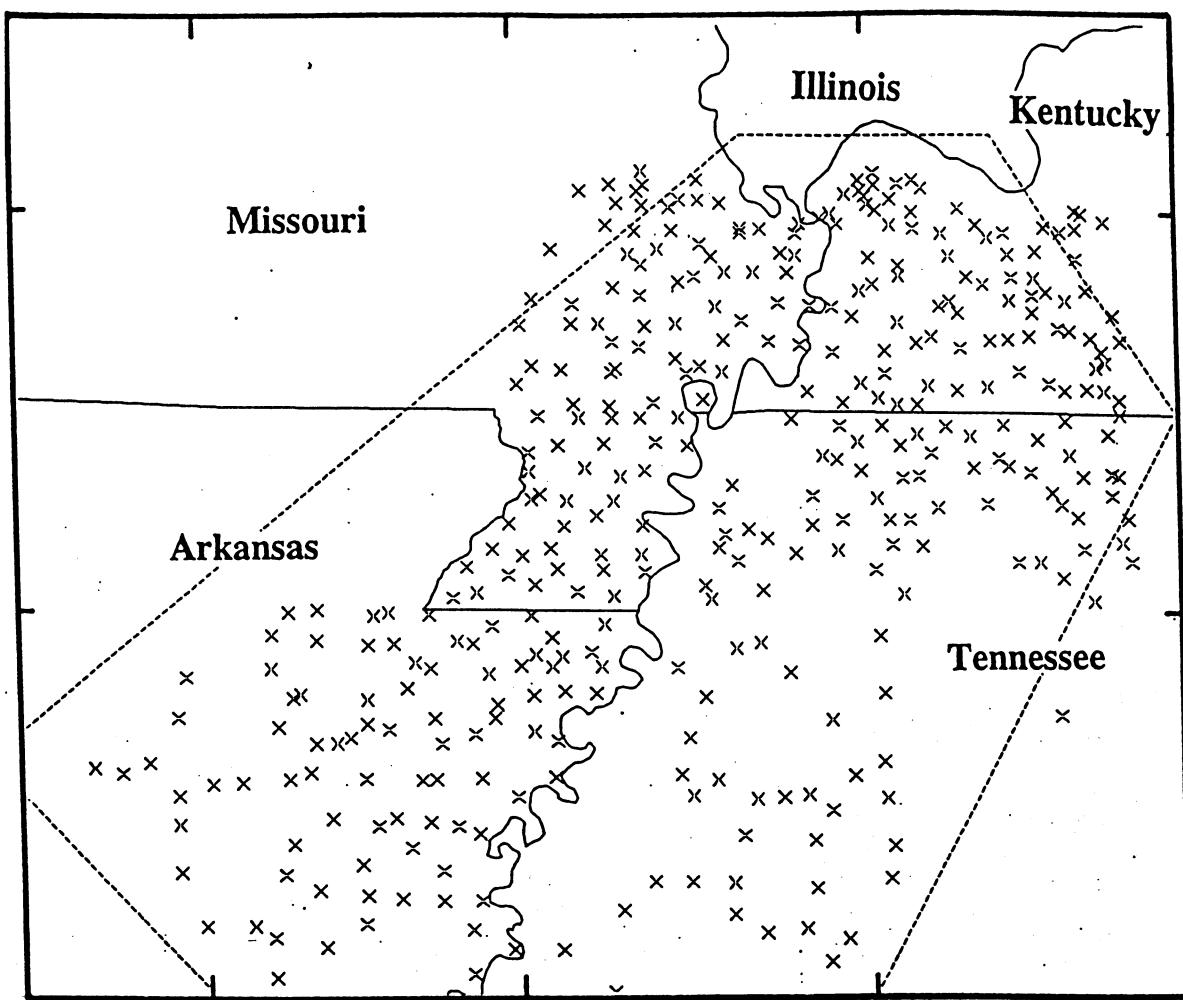
Missouri, and Tennessee are available to other researchers as SEG-Y files on CD's. Requests for the copies of the files should be sent to either the principle investigator at the above address, or to Dr. Edward Woolery at the Kentucky Geological Survey, University of Kentucky, Lexington, Ky., 40506-0107.

SH-wave data collected in Kentucky were used to generate a soil classification map of western Kentucky (Street et al., 1997). The primary source of funding for these investigations were obtained from the Kentucky Department of Transportation.

Permission has been obtained to include processed seismic sections from those sites as SEG-Y files on CD's along with the files for the other three states. These sections are currently being organized and will be available to other researchers by June, 1999.

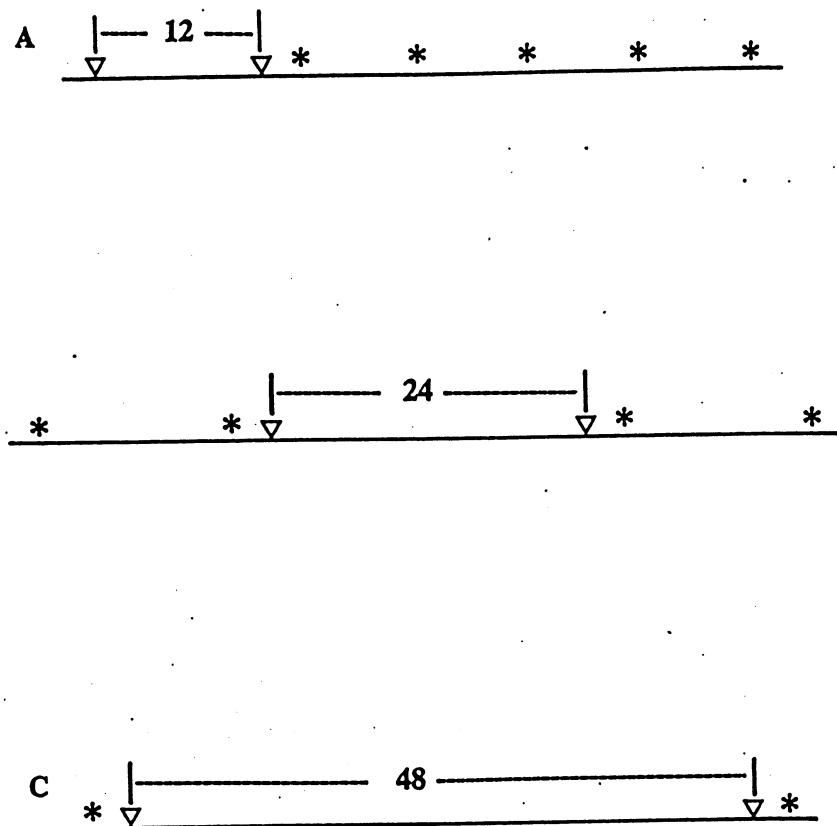
Figure 3 shows the general distribution of the  $V_s$  values. In the central part of the study area, in the lower elevations along the Mississippi river,  $V_s$  values were typically found to range from 600 to 800 ft/s (182 to 244 m/s). In western Kentucky,  $V_s$  values were typically found to range from 1,000 to 1,200 ft/s (305 to 366 m/s) with a few values in excess of 1,200 ft/s.  $V_s$  values in western Tennessee were typically found to be less than those calculated for sites in western Kentucky. This is due, in part, to the number of major river valleys and corresponding thick deposits of low-velocity alluvium in western Tennessee. Additional sites, well away from the major river valleys, are planned in western Tennessee to better characterize the shear-wave velocities at sites at elevations above the river valleys. Sites located either on, or just to the west of Crowley's Ridge (Rhea and Wheeler, 1995), are responsible for the narrow band of  $V_s$  values of 800 to 1,000 ft/s (244 to 305 m/s) seen in the southwestern corner of the study area of Figure 3.

Pseudo-dynamic site periods for that part of the soil column with shear-wave velocities less than 650 m/s have been estimated for a suite of sites in Arkansas along an east-west line near  $35.5^\circ$ . These estimates were obtained using the program SHAKE (Schnabel et al., 1972). The pseudo-dynamic site periods were calculated by assuming a "white noise" at the top of the stiff soil layer (i.e., a soil whose velocity is  $\geq 2,000$  ft/s), and calculating the dynamic response of the nearer-surface lower velocity soils. The input signal was limited to frequencies of 0.3 to 15 Hz, and a peak ground acceleration (PGA) of 0.06g. The results are shown in Figure 4. The site numbers given at the top of the plots in Figure 4 correspond to those given in Table I. Site 767, the first plot in Figure 4, is the western most site, while site 756 is the eastern most site.

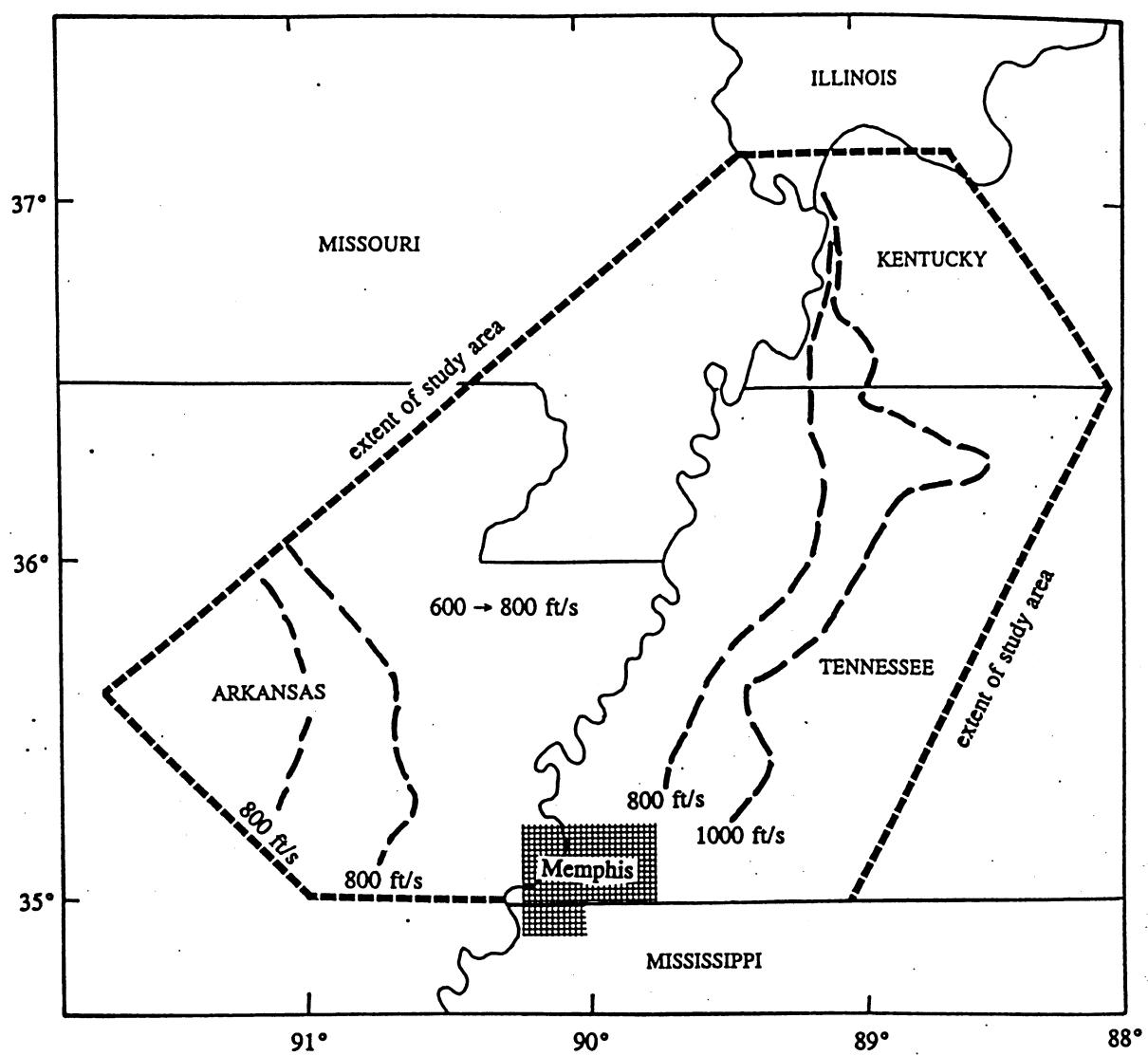


**Figure 1.** Locations where shear-wave data have been collected as part of this study or the Kentucky Department of Transportation study that preceded this study. The dashed lines mark the extend of the study area.

### GEOPHONE/SHOTPOINT GEOMETRIES USED IN STUDY

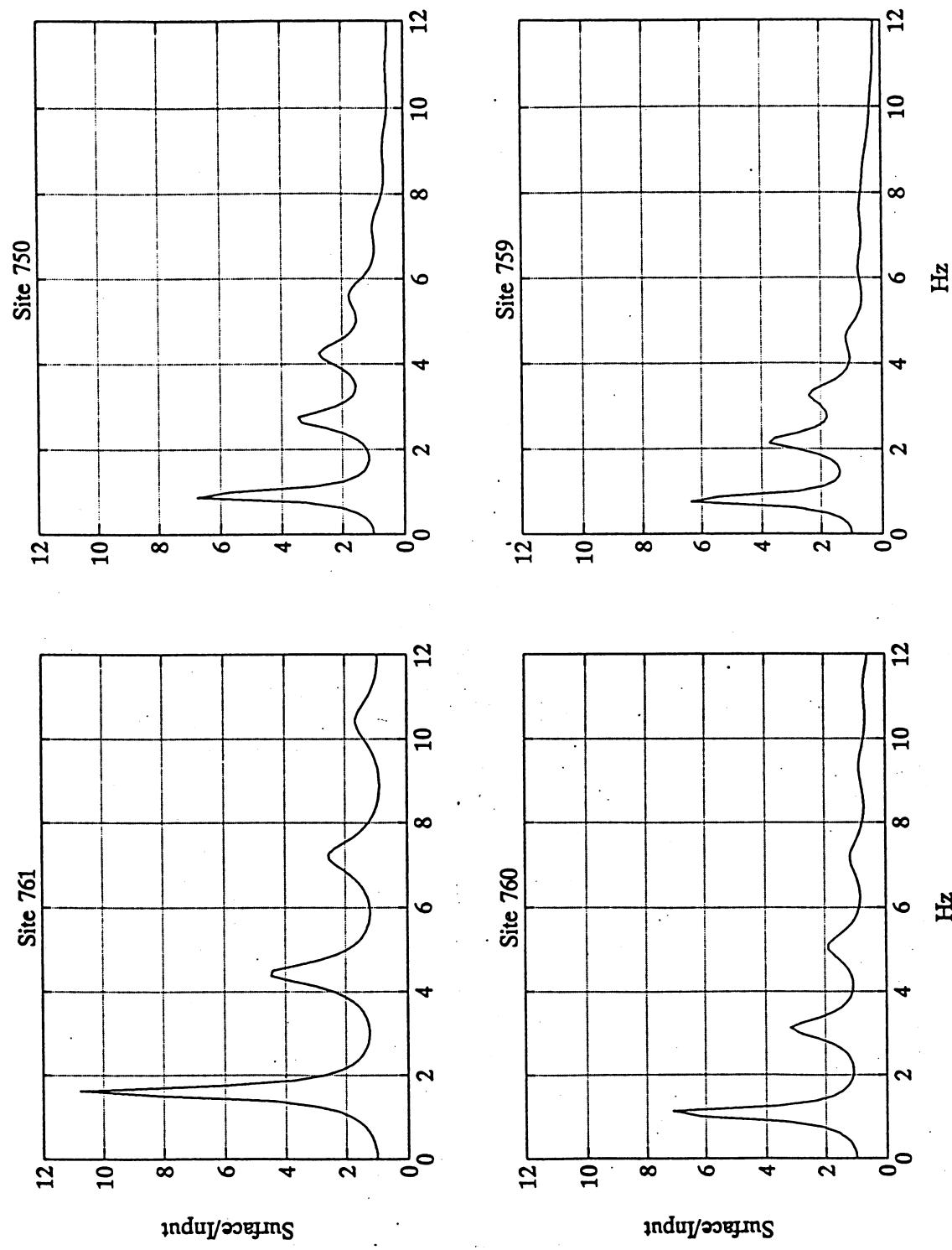


**Figure 2.** During the course of the study, the geophone/shotpoint geometries changed because of the availability of additional and improved equipment. The numbers refer to the number of geophones used in the geophone array, while the asterisks indicate positions of the shotpoints. Shotpoint offsets commonly used with array A were 20, 200, 400, 600, and 800 ft. Shotpoint offsets commonly used with array B were 20 and 400 ft., while offsets commonly used with array C were 20 ft.

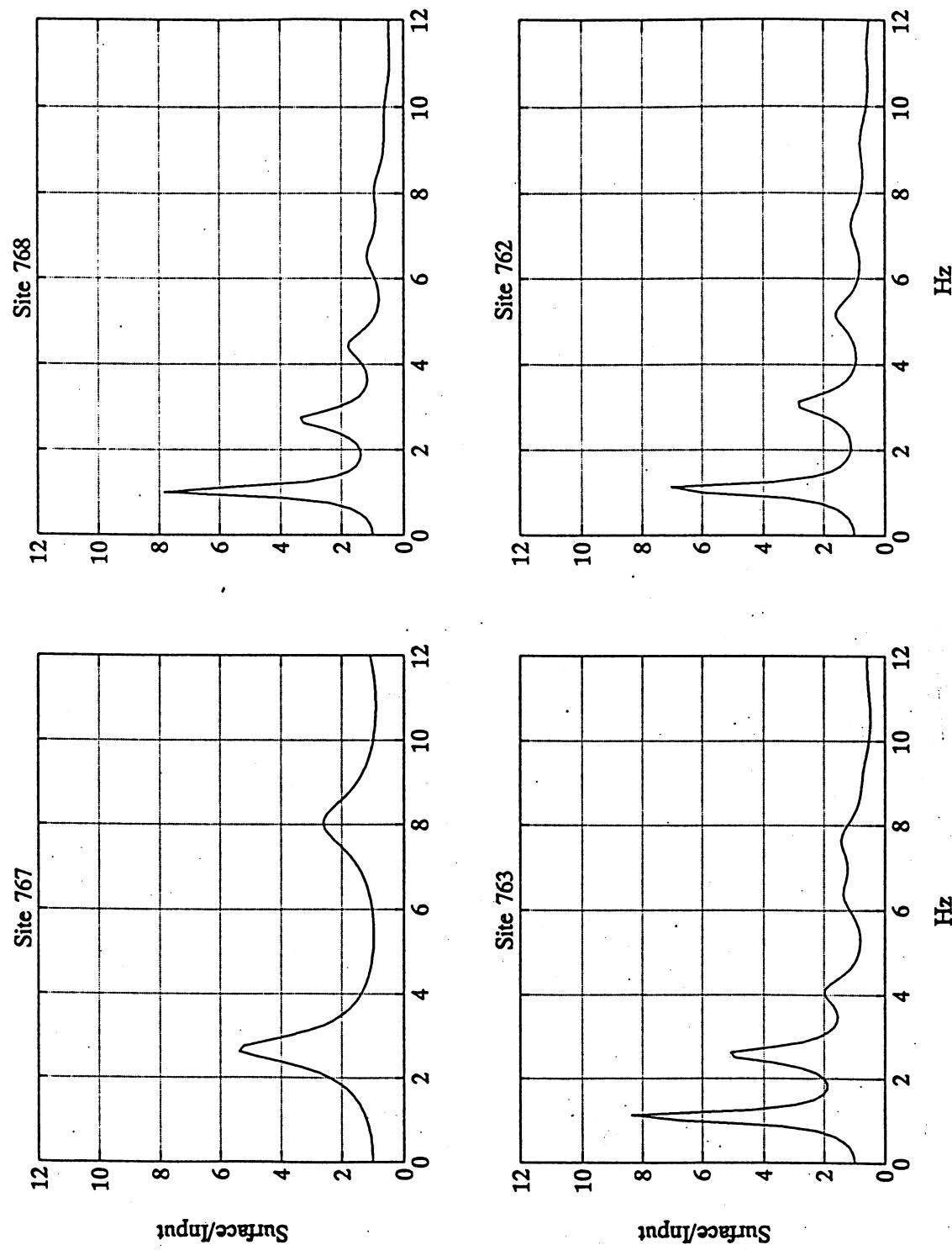


**Figure 3.** A generalized map the distribution of weighted shear-wave velocities of the soils (i.e.,  $V_s$ ).

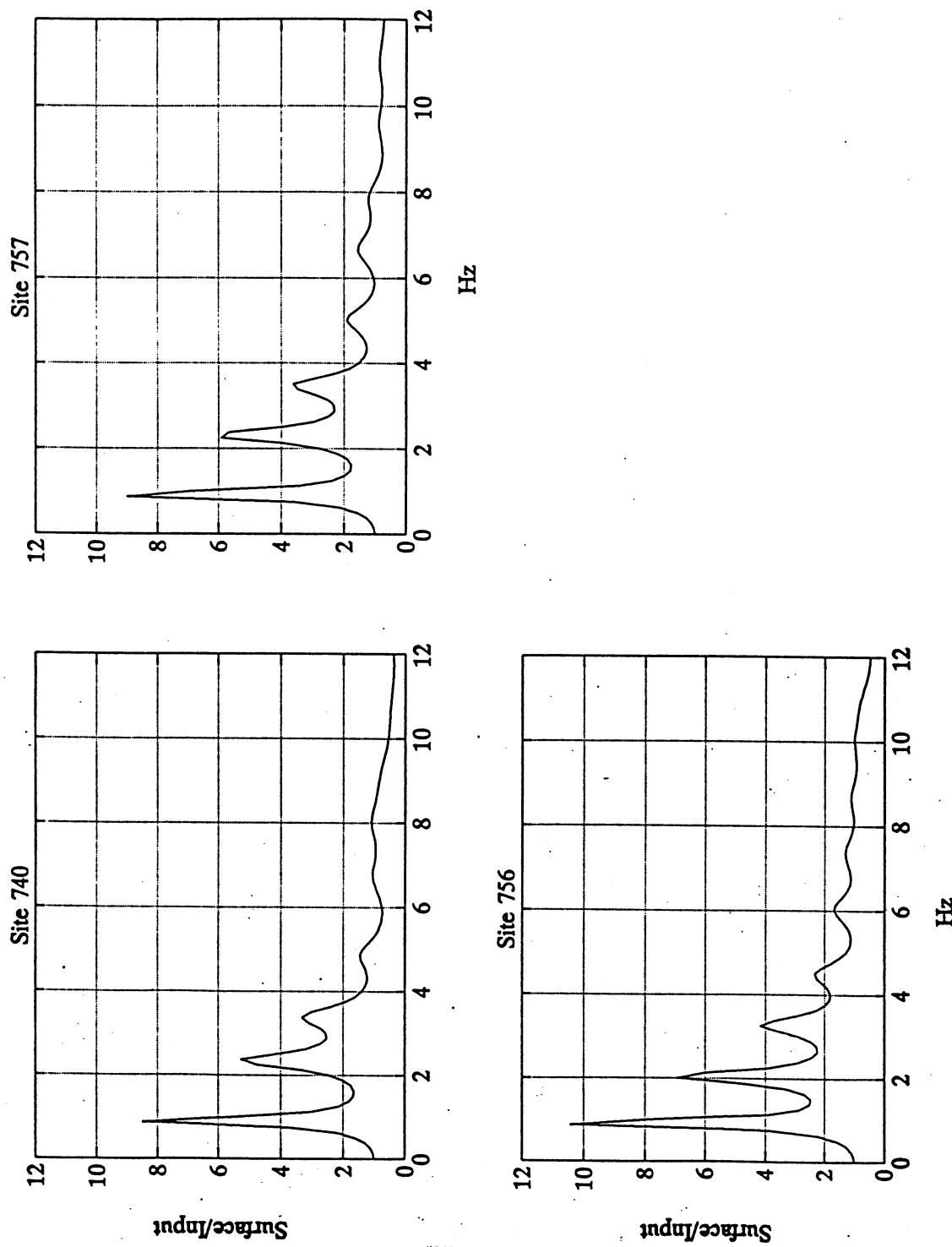
**Figure 4.** One-dimensional dynamic site responses at the sites indicated, taking into consideration only that part of the soil column above the "stiff" soil layer at each site. A stiff soil is defined herein as one with a shear-wave velocity of 1,950 ft/s (594 m/s) or greater).



**Figure 4 (continued).** One-dimensional dynamic site responses at the sites indicated, taking into consideration only that part of the soil column above the "stiff" soil layer at each site. A stiff soil is defined herein as one with a shear-wave velocity of 1,950 ft/s (594 m/s) or greater.



**Figure 4 (continued).** One-dimensional dynamic site responses at the sites indicated, taking into consideration only that part of the soil column above the "stiff" soil layer at each site. A stiff soil is defined herein as one with a shear-wave velocity of 1,950 ft/s (594 m/s) or greater.



## **Reports Published**

Street, R., E. Woolery, Z. Wang, and I.E. Harik (1997). Soil classifications for estimating site-dependent response spectra ad seismic coefficients for building code provisions in western Kentucky, International Journal of Engineering Geology **46**, 331-347.

Street, R., E. Woolery, Z. Wang, and J. Harris (1999). Utilizing NEHRP soil classifications for estimating site-dependent seismic coefficients in the central Mississippi river valley, *to be submitted to the International Journal of Engineering Geology*.

- a copy of this paper will be submitted to the US Geological Survey upon acceptance

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**TABLE I.1**  
**SITES INVESTIGATED IN NORTHEASTERN ARKANSAS**

Site	Date	Topo	Ele. (ft)	Location (°N/°W)	Array	Offsets <sup>1</sup> (ft)
701.	6/30/97	Blytheville	245	35.883/89.949	B	20,400,20,400
702.	6/30/97	Blytheville	248	35.931/89.980	B	400,20,20,400
703.	6/30/97	Half Moon	240	35.887/90.029	B	20,400,20,400
704.	6/30/97	Half Moon	240	35.985/90.042	B	400,20,20,400
705.	7/1/97	Luxora	239	35.857/89.979	B	400,20,20,400
706.	7/1/97	Luxora	240	35.796/89.942	B	400,20,20,400
707.	7/1/97	Dell	232	35.785/90.036	B	400,20,20,400
708.	7/1/97	Dell	239	35.858/90.074	B	400,20,20,400
709.	7/1/97	Manila N.	239	35.956/90.165	B	400,20,20,400
710.	7/1/97	Manila N.	237	35.911/90.225	B	400,20,20,400
711.	7/1/97	Manila S.	231	35.836/90.176	B	400,20,400,20
712.	7/1/97	Manila S.	231	35.760/90.149	B	400,20,400,20
713.	7/2/97	Armorel	250	35.895/89.860	B	400,20,20,400
714.	7/8/97	Armorel	256	35.965/89.819	B	400,20,20,400
715.	7/8/97	Rosa	254	35.859/89.829	B	400,20,400,20
716.	7/8/97	Rosa	248	35.792/89.846	B	400,20,400,20
717.	7/9/97	Leachville	236	35.917/90.917	B	400,20,400,20
718.	7/9/97	Leachville	238	35.982/90.361	B	400,400,20,20
719.	7/9/97	Caraway	233	35.847/90.357	B	400,20,400,20
720.	7/9/97	Lake City	229	35.861/90.404	B	400,20,400,20
721.	7/9/97	Lake City	224	35.797/90.429	B	400,400,20,20
722.	7/9/97	Dixie	233	35.907/90.469	B	400,400,20,20
723.	7/9/97	Dixie	247	35.985/90.487	B	400,400,20,20
724.	7/8/97	Brookland	280	35.977/90.533	B	400,20,400,20
725.	7/10/97	Brookland	248	35.903/90.550	B	400,20,400,20
726.	7/10/97	Lorado	311	35.912/90.711	B	400,20,400,20
727.	7/10/97	Lorado	373	35.989/90.709	B	400,400,20,20
728.	7/8/97	Bono	253	35.981/90.800	B	400,400,20,20
729.	7/8/97	Bono	248	35.924/90.854	B	400,400,20,20
730.	7/10/97	Herman	259	35.840/90.856	B	400,400,20,20
731.	7/10/97	Herman	255	35.767/90.786	B	400,400,20,20
732.	7/11/97	Jonesboro	237	35.777/90.763	B	400,400,20,20
733.	7/11/97	Needham	226	35.767/90.553	B	400,400,20,20
734.	8/14/97	Osceola	244	35.672/89.964	C	20',G24,20
735.	8/14/97	Keiser	235	35.695/90.035	C	20',G24,20
736.	8/14/97	Etowah	232	35.726/90.157	C	20',G24,20
737.	8/14/97	Etowah	228	35.684/90.220	C	20',G24,20
738.	8/14/97	Rivervale	223	35.722/90.344	C	20',G24,20
739.	8/14/97	Rivervale	222	35.659/90.322	C	20',G24,20
740.	8/14/97	Lepanto	218	35.570/90.341	C	20',G24,20
741.	10/19/97	NW Memphis	210	35.145/90.103	B	20,20,400

742.	10/19/97	W. Mempis	220	35.193/90.230	B	20,400,20,400
743	10/19/97	Fletcher Lake	214	35.081/90.222	B	20,20,400
744.	6/16/98	Hatchie Coon	221	35.693/90.486	B	0,240,0,240
745.	6/16/98	Truman	223	35.706/90.554	B	0,240,0,240
746.	6/16/98	Truman	223	35.671/90.606	B	0,240,0,240
747.	6/16/98	Greenfield	225	35.657/90.648	B	0,240,0,240
748.	6/16/98	Greenfield	248	35.655/90.713	B	0,230,0,240
749.	6/17/98	Otwell	247	35.695/90.833	B	0,240,0,240
750.	6/17/98	Powers	245	35.565/90.797	B	0,240,0,240
		Slough				
751.	6/17/98	Cherry	255	35.402/90.785	B	0,240,0,240
		Valley West				
752.	6/17/98	Vanndale	244	35.325/90.812	B	0,240,0,240
753.	6/17/98	Wynne	224	35.167/90.847	B	0,240,0,240
754.	6/17/98	Forest City	218	35.067/90.843	B	0,240,0,240
755.	6/16/98	Nodena	236	35.581/90.972	C	20,CL,20
756.	6/16/98	Wilson	225	35.530/90.087	C	20,CL,20
757.	6/16/98	Joiner	224	35.575/90.200	C	20,CL,20
758.	6/16/98	Marked Tree	216	35.567/90.384	C	20,CL,20
759.	6/16/98	McCormick	214	35.569/90.558	C	20,CL,20
760.	6/18/98	Harrisburg	257	35.583/90.732	C	20,CL,20
761.	6/17/98	Weiner	230	35.555/90.948	C	20,CL,20
762.	6/17/98	Amagon	230	35.550/91.057	C	20,CL,20
763.	6/17/98	Auvergne	220	35.518/91.201	C	20,CL,20
764.	6/17/98	Tupelo	225	35.446/91.199	C	20,CL,20
765.	6/17/98	McCory	208	35.327/91.193	C	20,CL,20
766.	6/17/98	Huff	590	35.582/91.557	C	20,CL,20
767.	6/17/98	Olyphant	220	35.570/91.612	C	20,CL,20
768.	6/17/98	Newport	222	35.599/91.324	C	20,CL,20
769.	6/17/98	Tuckrtman	242	35.714/91.202	C	20,CL,20
770.	6/17/98	Swifton West	247	35.815/91.169	C	20,CL,20
771.	6/18/98	Wittsburg	220	35.145/90.686	C	20,CL,20
772.	6/18/98	Gieseck	207	35.204/90.560	C	20,CL,20
773.	6/18/98	Parkin	217	35.551/90.554	C	20,CL,20
774.	6/18/98	Prinedale	255	35.287/90.706	C	20,CL,20
775.	6/18/98	Parkin	213	35.354/90.571	C	20,CL,20
776.	6/18/98	Earle	213	35.268/90.447	C	20,CL,20
777.	6/18/98	Heafer	216	35.340/90.321	C	20,CL,20
778.	6/18/98	Heafer	224	35.264/90.321	C	20,CL,20
779.	6/18/98	Jericho	220	35.266/90.202	C	20,CL,20
** Break in numbering						
788.	6/17/98	Hamlin	219	35.196/90.910	B	0,240,0,240
789.	6/17/98	Fair Oaks	218	35.193/91.087	B	0,240,0,240
790.	6/18/98	Cherry	224	35.936/90.663	B	0,240,0,240
		Valley East				
791.	6/18/98	Joyland	213	35.471/90.465	B	0,240,0,240
792.	6/18/98	Monterey	212	35.451/90.520	B	0,240,0,240
793.	6/18/98	Joyland	220	35.397/90.417	B	0,240,0,240
794.	6/18/98	Tyronza	220	35.463/90.359	B	0,240,0,240
795.	6/18/98	Tyronza	219	35.453/90.274	B	0,240,0,240

796. 6/18/98

Frenchman's 230 35.435/90.208  
Bayou

B 0,240,0,240

TABLE I.2

V<sub>t</sub><sup>2</sup> AT SITES INVESTIGATED

Topo	Site Number	V <sub>t</sub>
Amagon	762	751
Armored	713,714	623,592
Auvergne	763	682
Blytheville	701,702	671,663
Bono	728,729	713,751
Brookland	724,725	859,685
Caraway	719	710
Cherry Valley East	790	752
Cherry Valley West	751	923
Dell	707,708	631,679
Dixie	722,723	696,785
Earle	776	753
Etowah	736,737	603,664
Fair Oaks	789	821
Fletcher Lake	743	602
Forrest City	754	844
Frenchman's Bayou	796	644
Gieseck	772,747	684,782
Greenfield	748	845
Half Moon	703,704	686,674
Hamlin	788	895
Harrisburg	760	928
Hatchie Coon	744	743
Heafer	777,778	649,696
Herman	730,731	833,950
Huff	766	3,899
Jericho	779	614
Joiner	757	660
Joyland	791,793	720,780
Jonesboro	732,733	756,not estimated
Keiser	735	595
Lake City	720,721	632,676
Leachville	717,718	684,701
Lepanto	740	713
Lorado	726,727	675,1503
Luxora	705,706	647,657
Manila N.	709,710	628,638
Manila S.	711,712	658,698
McCormick	759	695
McCory	765	761

Marked Tree	758	633
Monterey	792	767
Newport	768	737
Nodena	755	586
Northwest Memphis	741	626
Olyphant	767	1,176
Osceola	734	700
Otwell	749	not estimated
Parkin	773,775	740,726
Powers Slough	750	840
Prinedale	774	1152
Rivervale	738,739	698,665
Rosa	715,716	707,658
Swifton West	747	782
Truman	745,746	688,697
Tukerman	769	725
Tupelo	764	614
Tyronza	794,795	774,720
Vanndale	752	919
Weiner	761	923
West Memphis	742	596
Wilson	756	612
Wittsburg	771	652
Wynne	753	883

1. Offsets are given in the sequence shot.

2.  $V_s$  is the weighted shear-wave velocity of the upper 100 ft (30 m) of the site profile. The weighted shear-wave velocity is calculated in accordance with equation 4.1.2.3-1 (pg. 35) of the 1997 edition of the NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures. Shear-wave velocities are given in ft/s. To convert velocities to m/s, multiply by 0.3048.

TABLE I.3

Site No.	Depth to interface (ft)/SH-wave velocity (ft/s) <sup>1</sup>						
	(1 ft = 0.3048 m)						
701	25	66	178	1558	26	55	
	483	664	948		491	645	897
702	32	90	167	1375	29	74	162
	505	726	1000		481	722	1013 1342
703	24	130			56	155	
	455	735	2769		498	1424	2777
704	29	111	232	1916	30	128	242
	499	797	1120		477	806	1481 2410
705	28	98	175		21	89	156

	421	766	1364	1533		444	721	1278	1415
706	30	73	172	262		19	67	151	248
	453	745	930	1242	1935	432	662	922	1253
707	30	107	161			15	67	149	208
	375	772	1203	1304		383	638	899	1250
708	28	129				28	143		
	528	728	1324			586	756	1600	
709	76	140	244			79	163	241	
	542	1084	1545	1961		582	1010	1383	1839
710	22	121	219			19	117	243	
	558	650	1383	1818		579	667	1290	1915
711	42	104	198			39	124	126	287
	584	759	1143	1614		493	796	1143	1293
712	23	61	165	241		15	83	125	135
	596	704	889	1238	1733	545	655	1019	1098
713	23	125	144			6	103	182	
	581	647	1290	1420		608	615	1111	1478
714	73	122	216			42	109	175	
	483	1053	1319	1565		512	727	1207	1535
715	41	122	149			41	123	195	
	619	784	1250	1341		619	784	1226	1449
716	32	106	195			23	132		
	496	761	1117	1486		525	722	1673	
717	46	180				76	178		
	614	824	2712			573	1353	1609	
718	51	127	201						
	589	894	1010	1765					
719	32	79	172	216		23	97	266	284
	608	750	988	1096	1910	623	697	1197	1230
720	21	99	236			18	116		
	592	645	1167	2143		593	635	1379	
721	23	67	111	287		27	62	126	192
	483	652	958	1323	2449	481	714	914	1212
722	30	90	114	186		18	82	169	246
	592	711	984	1053	2609	625	677	952	1905
723	30	114	209			47	204	325	
	662	818	1319	1714		649	1026	1317	2593
724	39					37	168	246	
	632	1016				653	1013	1500	2171
725	42	103	298			34	94		
	640	791	942	2500		558	690	952	
726	71	152				79	154		
	560	1364	2105			596	1333	2222	
727	31					31			
	885	2011				1000	2093		
728	104								
	713	1758							
729	74					71			
	615	2121				592	2121		
730	40	131				84	287		

	814	1020	1586		620	1642	1783	
731	43	138			43	136		
	809	1101	2857		806	1090	2696	
732	47	215			76	210		
	674	865	2174		702	941	2118	
733	24	219			66	251		
	561	778	3107		617	966	3048	
734	37	93	207		39	97	189	
	566	794	1020	1546	559	823	1067	1447
735	20	95			19	101		
	400	659	1667		421	652	1646	
736	33	97	166	223	33	105	164	210
	412	779	1156	1503	1667	410	772	1197
737	33	92	198		35	103	201	
	491	773	1259	2075	495	807	1325	2075
738	23	56	200	263	38	107	200	347
	599	711	808	1786	2727	549	791	1361
739	30	192	347		28	155	365	
	581	721	2174	3265	530	725	1667	3556
740	38	147			35	159		
	556	872	1538		559	826	1718	
741	85				85			
	568	1410			568	1549		
742	44	141			73	169		
	400	1009	2069		498	1250	2500	
743	85				97			
	565	1410			571	1613		
744	15	81	133	249	27	67	142	233
	615	699	1034	1471	2222	606	761	941
745	28	91	201		21	90	177	
	552	707	1176	1806	599	693	1143	1773
746	54	172			47	151		
	591	894	1684		562	878	1520	
747	33	90	217		30	91	157	194
	576	902	1575	1702	581	851	1587	1739
748	17	58	164		27			
	686	805	988	1584	656	980		
749	82				78			
	771	1579			765	1612		
750	22	171						
	615	937	1882					
751	43	135			47	139		
	756	1075	1481		810	1083	1600	
752	79				134			
	907	1087			897	1030		
753	40	87			33	115		
	704	993	1199		750	982	1278	
754	142				89			
	855	1550			786	1582		
755	32	146			24	127		

	<b>390</b>	<b>724</b>	<b>1600</b>		<b>437</b>	<b>686</b>	<b>1572</b>
<b>756</b>	<b>31</b>	<b>82</b>	<b>166</b>		<b>23</b>	<b>72</b>	<b>150</b>
	<b>416</b>	<b>739</b>	<b>1103</b>	<b>1551</b>	<b>407</b>	<b>643</b>	<b>1003</b>
<b>757</b>	<b>34</b>	<b>136</b>	<b>282</b>		<b>25</b>	<b>138</b>	<b>262</b>
	<b>467</b>	<b>791</b>	<b>1421</b>	<b>2044</b>	<b>491</b>	<b>780</b>	<b>1448</b>
<b>758</b>	<b>32</b>	<b>148</b>	<b>336</b>		<b>44</b>	<b>183</b>	
	<b>477</b>	<b>718</b>	<b>1688</b>	<b>3048</b>	<b>514</b>	<b>811</b>	<b>1935</b>
<b>759</b>	<b>47</b>	<b>141</b>			<b>44</b>	<b>171</b>	
	<b>601</b>	<b>845</b>	<b>1290</b>		<b>567</b>	<b>805</b>	<b>1587</b>
<b>760</b>	<b>55</b>	<b>199</b>					
	<b>821</b>	<b>1055</b>	<b>2124</b>				
<b>761</b>	<b>46</b>	<b>133</b>			<b>28</b>	<b>149</b>	
	<b>784</b>	<b>1155</b>	<b>2407</b>		<b>725</b>	<b>989</b>	<b>2843</b>
<b>762</b>	<b>63</b>	<b>141</b>			<b>41</b>	<b>141</b>	
	<b>639</b>	<b>1010</b>	<b>2007</b>		<b>653</b>	<b>873</b>	<b>2154</b>
<b>763</b>	<b>98</b>				<b>88</b>		
	<b>679</b>	<b>1697</b>			<b>616</b>	<b>1715</b>	
<b>764</b>	<b>100</b>				<b>98</b>		
	<b>596</b>	<b>1828</b>			<b>631</b>	<b>1758</b>	
<b>765</b>	<b>140</b>				<b>134</b>		
	<b>770</b>	<b>2227</b>			<b>751</b>	<b>2397</b>	
<b>766</b>	<b>103</b>				<b>76</b>		
	<b>3308</b>	<b>9067</b>			<b>4490</b>	<b>6593</b>	
<b>767</b>	<b>73</b>				<b>68</b>		
	<b>1022</b>	<b>5333</b>			<b>741</b>	<b>6178</b>	
<b>768</b>	<b>34</b>	<b>187</b>			<b>57</b>	<b>183</b>	
	<b>609</b>	<b>843</b>	<b>2710</b>		<b>580</b>	<b>1100</b>	<b>2935</b>
<b>769</b>	<b>138</b>				<b>118</b>		
	<b>714</b>	<b>2057</b>			<b>735</b>	<b>1774</b>	
<b>770</b>	<b>63</b>	<b>149</b>			<b>48</b>	<b>137</b>	
	<b>595</b>	<b>1200</b>	<b>2505</b>		<b>650</b>	<b>1039</b>	<b>2296</b>
<b>771</b>	<b>33</b>	<b>132</b>	<b>248</b>		<b>68</b>	<b>285</b>	
	<b>498</b>	<b>615</b>	<b>1481</b>	<b>1992</b>	<b>641</b>	<b>1046</b>	<b>2278</b>
<b>772</b>	<b>58</b>	<b>161</b>			<b>31</b>	<b>140</b>	
	<b>532</b>	<b>1142</b>	<b>1992</b>		<b>553</b>	<b>762</b>	<b>2062</b>
<b>773</b>	<b>42</b>	<b>151</b>			<b>27</b>	<b>108</b>	
	<b>586</b>	<b>889</b>	<b>1603</b>		<b>602</b>	<b>823</b>	<b>1405</b>
<b>774</b>	<b>35</b>	<b>124</b>			<b>37</b>	<b>117</b>	
	<b>995</b>	<b>1278</b>	<b>1694</b>		<b>955</b>	<b>1290</b>	<b>1678</b>
<b>775</b>	<b>36</b>	<b>118</b>			<b>25</b>	<b>89</b>	
	<b>601</b>	<b>791</b>	<b>1301</b>		<b>552</b>	<b>798</b>	<b>1176</b>
<b>776</b>	<b>47</b>	<b>140</b>			<b>40</b>	<b>151</b>	
	<b>652</b>	<b>847</b>	<b>1837</b>		<b>704</b>	<b>809</b>	<b>1728</b>
<b>777</b>	<b>84</b>	<b>187</b>			<b>79</b>	<b>222</b>	
	<b>610</b>	<b>1244</b>	<b>1937</b>		<b>563</b>	<b>1188</b>	<b>1905</b>
<b>778</b>	<b>48</b>	<b>170</b>			<b>58</b>	<b>135</b>	
	<b>561</b>	<b>826</b>	<b>1874</b>		<b>615</b>	<b>933</b>	<b>1468</b>
<b>779</b>	<b>56</b>	<b>135</b>			<b>36</b>	<b>106</b>	

	494	848	1625		473	755	1384
788	5	72			5	80	
	741	864	1061		773	884	1019
789	78	180			47	167	
	720	1176	1957		714	1034	1956
790	95	190			96		
	746	1467	1951		722	1538	
791	41	80	199		42	87	223
	629	828	956	1860	557	795	967
792	37	145			50	221	2667
	644	139	1361		621	1044	1905
793	18	73	121		17	34	152
	571	741	909	1256	524	746	992
794	28	149			40	163	1803
	600	952	1846		574	891	1983
795	42				41		
	637	784			647	791	
796	16	80					
	444	620	1257				

1. The first line of numbers for each site indicates the depths to interfaces in the soil column, the second line of numbers indicates the shear-wave velocities of the soil layers. For example, at site 701 a reversed refraction profile was acquired. From the left-hand set of numbers, interfaces were interpreted at 25, 66, and 178 ft, respectively, and the shear-wave velocities of the soil layers were interpreted as being 483, 664, 948, and 1558 ft/s, respectively.

**TABLE II.1**  
**SITES INVESTIGATED IN SOUTHEASTERN MISSOURI**

Site	Date	Topo	Ele. (ft)	Location (°N/°W)	Array	Offsets <sup>1</sup> (ft)
301.	5/21/96	Wyatt	315	36.971/89.208 A		20,220,420
302.	5/21/96	Wyatt	315	36.892/89.221 A		20,220,420,620,820
303.	5/21/96	Charleston	315	36.897/89.266 A		20,200,400,600,800
304.	5/21/96	Charleston	317	36.956/89.331 A		20,200,400,600,800
305.	5/21/96	Bertrand	317	36.886/89.484 A		20,200,400,600,800
306.	5/21/96	Bertrand	326	36.958/89.392 A		20,200,400,600,800
307.	5/21/96	Sikeston N	315	36.917/89.520 A		20,200,400,600,800
308.	5/21/96	Sikeston N	335	36.950/89.608 A		20,200,400,600,800
309.	5/22/96	Morley	330	37.054/89.585 A		20,200,400,600,800
310.	5/22/96	Morley	310	37.054/89.526 A		20,200,400,600,800
311.	5/22/96	Thebes	322	37.040/89.457 A		20,200,400,600,800
312.	6/27/96	Vanduser	305	36.903/89.653 A		20,200,400,600,800
313.	6/27/96	Vanduser	305	36.947/89.725 A		20,200,400,600,800
314.	6/28/96	Oran	315	37.024/89.701 A		20,200,400,600
315.	6/28/96	Oran	325	37.096/89.717 A		20,200,400,600
316.	6/28/96	Chaffee	330	37.126/89.697 A		20,200,400,600
317.	6/28/96	Chaffee	330	37.196/89.705 A		20,200,400,600
318.	6/28/96	White Water	325	37.126/89.803 A		20,200,400,600
319.	6/28/96	Bell City	315	37.034/89.781 A		20,200,400,600
320.	6/28/96	Clines Island	310	36.961/89.814 A		20,200,400,600
321.	6/28/96	Clines Island	305	36.890/89.745 A		20,200,400,600
322.	6/28/96	Bloomfield	390	36.900/89.982 A		20,200,400
323.	6/29/96	Anniston	315	36.848/89.351 A		20,200,400,600
324.	6/29/96	Wickliffe SW	305	36.849/89.246 A		20,200,400,600,800
325.	7/16/96	New Madrid	300	36.592/89.562 A		20,200,400,600,800
326.	7/16/96	Kewanee	300	36.629/89.596 A		20,200,400,600,800
327.	7/16/96	Kewanee	300	36.716/89.596 A		20,240,460,680
328.	7/16/96	Sikeston S	315	36.821/89.588 A		20,200,400,600,800
329.	7/16/96	Sileston S	305	36.835/89.538 A		20,200,400,600,800
330.	7/17/96	Point Pleasant	290	36.483/89.588 A		20,200,400,600,800
331.	7/17/96	Point Pleasant	283	36.413/89.560 A		20,200,400,600,800
332.	7/31/96	Morehouse	299	36.863/89.705 A		20,200,400,600,800
333.	7/31/96	Morehouse	291	36.786/89.708 A		20,200,400,600,800
334.	7/31/96	Charter Oak	288	36.710/89.693 A		20,200,400,600,800
335.	7/31/96	Charter Oak	284	36.657/89.710 A		20,200,400,600,800
336.	7/31/96	Hills Store	285	36.670/89.795 A		20,200,400,600,800
337.	7/31/96	Hills Store	290	36.715/89.838 A		20,200,400,600,800
338.	7/31/96	Bernie	291	36.715/89.921 A		20,200,400,600,800
339.	7/31/96	Dexter	295	36.764/89.917 A		20,200,400,600,800
340.	7/31/96	Essex	294	36.806/89.791 A		20,200,400,600,800
341.	8/1/96	East Prairie	295	36.760/89.470 A		20,200,400,600,800
342.	8/1/96	East Prairie	310	36.848/89.441 A		20,200,400,600,800
343.	8/1/96	Wyatt	315	36.986/89.145 A		20,200,400,600,800

344.	8/5/96	Caruthersville	267	36.213/89.700	A	20,200,400,600,800
345.	8/5/96	Caruthersville	265	36.140/89.704	A	20,200,400,600,800
346.	8/6/96	Catron	280	36.519/89.665	A	20,200,400,600,800
347.	8/6/96	Catron	280	36.594/89.798	A	20,200,400,600,800
348.	8/6/96	Parma	280	36.603/89.784	A	20,200,400,600,800
349.	8/6/96	Parma	275	36.510/89.804	A	20,200,400,600,800
350.	8/6/96	Malden	280	36.600/89.951	A	20,200,400,600,800
351.	8/6/96	Malden	270	36.514/89.914	A	20,200,400,600,800
352.	8/6/96	Valley Ridge	300	36.608/90.040	A	20,200,400,600,800
353.	8/6/96	Campbell	290	36.484/90.022	A	20,200,400,600,800
354.	8/6/96	Campbell	280	36.392/90.051	A	20,200,400,600,800
355.	8/6/96	Gideon	275	36.411/89.960	A	20,200,400,600,800
356.	8/7/96	Portageville	280	36.421/89.659	A	20,200,400,600,800
357.	8/7/96	Portageville	275	36.482/89.708	A	20,200,400,600,800
358.	8/7/96	Boekerton	270	36.481/89.795	A	20,200,400,600,800
359.	8/7/96	Boekerton	265	36.416/89.821	A	20,200,400,600,800
360.	8/7/96	Gideon	270	36.481/89.898	A	20,200,400,600,800
361.	8/7/96	Kenneth N	275	36.345/90.050	A	20,200,400,600,800
362.	8/7/96	Kenneth N	260	36.276/90.042	A	20,200,400,600,800
363.	8/7/96	Bragg City	255	36.273/89.935	A	20,200,400,600,800
364.	8/7/96	Bragg City	260	36.355/89.879	A	20,200,400,600,800
365.	8/7/96	Wardell	270	36.335/89.769	A	20,200,400,600,800
366.	8/8/96	Hayti Heights	260	36.236/89.844	A	20,200,400,600,800
367.	8/8/96	Deering	250	36.210/89.942	A	20,200,400,600,800
368.	8/8/96	Hayti Heights	260	36.139/89.830	A	20,200,400,600,800
369.	8/12/96	Cottonwood	260	36.096/89.692	A	20,200,400,600,800
		Point				
370.	8/12/96	Steele	260	36.036/89.789	A	20,200,400,600,800
371.	8/12/96	Steele	260	36.102/89.822	A	20,200,400,600,800
372.	8/12/96	Denton	250	36.046/89.902	A	20,200,400,600,800
373.	8/12/96	Denton	250	36.103/89.963	A	20,200,400,600,800
374.	8/12/96	Deerin	250	36.154/89.983	A	20,200,400,600,800
375.	8/13/96	Kennett S	250	36.289/90.016	A	20,200,400,600,800
376.	8/13/96	Kennett S	255	36.134/90.070	A	20,200,400,600,800
377.	8/13/96	Senath	255	36.149/90.165	A	20,200,400,600,800
378.	8/13/96	Arbyrd	250	36.103/90.245	A	20,200,400,600,800
379.	8/13/96	Cardwell	245	36.025/90.287	A	20,200,400,600,800
380.	8/13/96	Arbyrd	245	36.040/90.213	A	20,200,400,600,800
381.	8/13/96	Homersville	250	36.085/90.114	A	20,200,400,600,800
382.	8/13/96	Homersville	243	36.063/90.031	A	20,200,400,600,800
383.	8/13/96	Stanley	275	36.350/89.693	A	20,200,400,600,800
384.	8/13/96	Wardell	265	36.274/89.791	A	20,200,400,600,800
385.	8/14/96	Hubbard	290	36.598/89.449	A	20,200,400,600,800
		Lake				
386.	8/14/96	Henderson	295	36.677/89.445	A	20,200,400,600,800
		Mound				
387.	8/14/96	Henderson	295	36.726/89.387	A	20,200,400,600,800
		Mound				
388.	8/14/96	Bayouville	300	36.675/89.303	A	20,200,400,600,800
389.	8/26/96	New Madrid	295	36.611/89.520	A	20,200,400,600,800

390.	8/26/96	Scott City	385	37.157/89.530 A	20,200,400,600,800
391.	8/26/96	Scott City	370	37.015/89.617 A	20,200,400,600,800
392.	8/26/96	Advance	360	37.093/89.895 A	20,200,400,600,800
393.	8/27/96	Dudley	340	36.776/90.041 A	20,200,400,600
394.	8/27/96	Powe	325	36.710/90.079 A	20,200,400,600,800
395.	8/27/96	Valley Ridge	340	36.562/90.088 A	20,200,400,600,800
396.	8/27/96	Kennett S	260	36.214/90.112 A	20,200,400,600,800
397.	8/26/96	Wickliffe SW	310	36.766/89.176 A	20,200,400,600,800
398.	8/26/96	Anniston	300	36.772/89.274 A	20,200,400,600,800
399.	8/26/96	Wolf Island	300	36.667/89.207 A	20,200,400,600,800
400.	7/2/98	Wyatt	316	36.946/89.221 A	20,200,400,600,800

TABLE II.2

 $V_s^2$  AT SITES INVESTIGATED

Topo	Site Number	$V_s$
Advance	392	842
Anniston	315,398	972,661
Arbyrd	378,380	688,650
Bayouville	388	624
Bertrand	305,306	679,703
Bell City	319	558
Bernie	338	685
Bloomfield	322	983
Boekerton	358,359	694,679
Bragg City	363,364	710,643
Campbell	353,354	672,734
Cardwell	379	650
Caruthersville	344,345	629,594
Catron	346,347	606,671
Chaffee	316,317	972,656
Charleston	303,304	643,606
Charter Oak	334,335	653,651
Clines Island	320,321	667,700
Cottonwood Point	369	578
Deering	367,374	667,679
Denton	372,373	648,661
Dexter	339	784
Dudley	393	807
East Prairie	341,342	660,667
Essex	340	704
Gideon	355,360	642,609
Hayti Heights	366,368	710,665
Henderson Mound	386,387	638,649
Hills Store	336,337	681,683
Homersville	381,382	667,646
Hubbard Lake	385	585

Kewanee	326,327	631,607
Kennett North	361,362	692,685
Kennett South	375,376,396	616,711,674
Malden	350,351	588,637
Morley	309,310	662,819
Morehouse	332,333	670,674
New Madrid	325,389	665,689
Oran	314,315	707,972
Parma	348,349	660,565
Point Pleasant	330,331	628,550
Portageville	356,357	656,681
Powe	394	693
Scott City	390,391	1045,842
Senath	377	633
Sikeston North	307,308	707,676
Sikeston South	328,329	754,693
Stanley	383	685
Steele	370,371	621,653
Thebes SW	311	641
Valley Ridge	352,395	738,794
Vanduser	312,313	695,591
Wardell	365,384	677,651
White Water	318	571
Wickliffe SW	324,397	563,667
Wolf Island	399	600
Wyatt	301,302,343	572,658,618

1. Travel times for the offsets were spliced together to form composite seismic sections, as described in Street *et al.* (1995). Offsets are given in the sequence in which they were shot.
2.  $V_s$  is the weighted shear-wave velocity of the upper 100 ft (30 m) of the site profile. The weighted shear-wave velocity is calculated in accordance with equation 4.1.2.3-1 (pg. 35) of the 1997 edition of the NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures. Shear-wave velocities are given in ft/s. To convert velocities to m/s, multiply by 0.3048.

TABLE II.3

Site No.	Depth (ft)/Velocities (ft/s) <sup>1</sup>				
301	11	57	114	200	
	395	520	733	1093	1925
302	80	144	343		
	600	1070	1307	2414	

303	19	86		
	432	679	1097	
304	22	93	243	
	374	707	1202	1732
305	14	63	220	
	549	592	950	1860
306	25	70	161	
	587	667	933	1754
307	20	42	130	
	591	694	765	1419
308	37	97	202	
	571	748	1053	1948
309	33	197		
	576	715	1373	
310	25	218		
	578	952	2485	
311	23	184		
	394	788	2938	
312	14	43	107	208
	513	654	789	1091
313	14	69	202	1679
	508	569	909	2432
314	16	111		
	435	803	4762	
315	51			
	571	3611		
316	22	98		
	529	690	2941	
317	21	94		
	352	621	4941	
318	21	86		
	420	541	2857	
319	93			
	522	6909		
320	12	44	139	
	448	614	789	1648
321	18	111		
	596	728	1656	
322	36	84		
	625	1351	1863	
323	43	263		
	536	861	3175	
324	43	146	303	
	391	843	1123	1967
325	52	99	403	
	588	773	881	4000
326	28	146		
	574	657	1708	
327	48	121		
	507	741	1508	

328	60	188		
	704	843	1727	
329	52	181		
	571	901	1638	
330	80	177		
	582	915	1538	
331	42	113		
	411	727	1412	
332	15	57	186	
	405	673	863	1992
333	37	185		
	513	827	1946	
334	9	127		
	500	673	1465	
335	12	50	338	
	404	551	910	2667
336	15	78	144	268
	510	665	970	1259
337	15	80	143	
	500	667	1050	1168
338	61	110		
	560	1053	1529	
339	61			
	597	1538		
340	21	59	163	
	533	670	894	2093
341	33	149		
	573	714	1505	
342	20	119	340	
	447	761	1250	3188
343	21	82	181	
	484	619	909	1756
344	56	129	314	
	516	872	1103	2105
345	26	60	104	228
	415	606	808	1127
346	21	98		
	519	625	1436	
347	35	86		
	479	800	1152	
348	68	170	320	
	580	934	1212	2342
349	22	84		
	513	599	1156	
350	17	168		
	444	630	2267	
351	18	49	114	192
	417	615	803	1111
352	24	63	138	
	519	654	909	1954

353	65	133		
	578	960	1957	
354	26	142		
	622	784	1743	
355	27	85	140	
	511	685	1361	1689
356	53	161		
	539	867	1494	
357	17	80	130	238
	538	674	952	1242
				1778
358	67			
	570	1244		
359	32	90	135	
	502	769	1237	1489
360	30	109		
	456	709	1326	
361	78	165		
	644	938	2192	
362	67	222		
	601	955	1863	
363	3	48	177	
	510	676	758	1759
364	37	104		
	500	773	1353	
365	37	107		
	495	864	1714	
366	46	175	294	
	542	964	1582	2151
367	30	178		
	520	759	1714	
368	19	74	133	221
	483	655	961	1081
				1333
369	16	102		
	508	593	1143	
370	51	137	285	
	496	843	1329	1957
371	34	136		
	501	773	2381	
372	26	110		
	451	765	1378	
373	17	50	183	
	437	625	839	2118
374	34	66	230	
	495	793	889	2139
375	74	181		
	516	1382	2083	
376	56	141		
	561	1077	1420	
377	27	136		
	556	667	2591	

378	45	167		
	579	813	2094	
379	22	61	221	
	446	651	872	2890
380	14	73	202	
	482	606	988	1775
381	50	195		
	532	893	1587	
382	34	86	205	
	468	766	980	1929
383	18	86	185	252
	419	645	988	1565 1895
384	21	79	230	
	450	648	1205	1818
385	41	98	237	
	495	659	1159	1538
386	15	85	151	
	405	655	1169	1513
387	11	67	163	
	422	606	925	1100
388	56	148		
	491	952	1391	
389	73	187		
	619	996	1600	
390	50			
	615	3468		
391	poor data			
392	102			
	842	5200		
393	90			
	761	1747		
394	35	98		
	570	769	1860	
395	26	37	247	
	609	806	905	1988
396	33	94	195	
	571	714	1146	1754
397	24	76	160	
	446	705	1077	1424
398	46	186		
	511	883	1550	
399	82	173		
	545	1119	2167	

1. Depths to interfaces are given in the first row, while formation velocities are given in the second row.

**TABLE III.1**  
**SITES INVESTIGATED IN NORTHWESTERN TENNESSEE**

Site	Date	Topo	Ele. (ft)	Location (°N/°W)	Array	Offsets <sup>1</sup> (ft)
501.	5/13/96	Clayton	325	36.482/89.233	A	{20,200,400,600,800}
502.	5/13/96	Clayton	369	36.391/89.136	A	{20,200,400,600,800}
503.	10/14/96	Miston	275	36.191/89.439	A	{20,200,400,600,800}
504.	10/14/96	Ridgely	285	36.315/89.417	A	{20,200,400,600,800}
505.	1/3/97	Union City	376	36.466/89.083	C <sup>2</sup>	0,0,260,0,0
506.	1/3/97	Harris	360	36.467/88.951	B	20,400,20,400
507.	1/3/97	Harris	329	36.417/88.891	B	20,400,20,400
508.	1/31/97	Union City	345	36.382/89.092	C	0,0
509.	2/01/97	McConnell	350	36.446/88.836	C	0,0
510.	2/01/97	McConnell	340	36.398/88.790	C	0,0
511.	2/01/97	Latham	435	36.465/88.744	C	0,200,0
512.	2/01/97	Latham	380	36.441/88.666	C	0,0
513.	2/01/97	Palmersville	410	36.469/88.556	C	0,0
514.	3/19/97	Puryear	550	36.393/88.344	C	0,0
515.	3/19/97	Cottage	425	36.433/88.446	C	0,0
		Grove				
516.	3/19/97	Palmersville	480	36.385/88.571	C	0,400,0,400
517.	3/19/97	Dresden	380	36.360/88.655	C	0,0
518.	3/20/97	Obion	400	36.345/88.210	C	0,0
519.	3/20/97	Obion	299	36.290/89.166	C	400,0,400
520.	3/20/97	Rives	290	36.427/89.028	C	0,400,0,400
521.	3/20/97	Rives	310	36.354/89.016	C	0,0
522.	3/20/97	Gardner	330	36.335/88.883	C	0,0
523.	3/20/97	Gardner	300	36.284/88.967	C	0,0
524.	3/20/97	Rutherford	300	36.230/88.926	C	0,0
525.	3/21/97	Trimble	323	36.216/89.167	C	0,0
526.	3/21/97	Trimble	300	36.145/89.219	C	0,0
527.	3/21/97	Kenton	350	36.154/89.088	C	0,0
528.	3/21/97	Kenton	340	36.230/89.073	C	0,400,0,400
<b>** Break in Numbering</b>						
530.	6/11/97	W. Sandy Dike	370	36.340/88.190	C	0,0
531.	6/11/97	W. Sandy Dike	450	36.290/88.210	C	0,0
532.	6/11/97	Manleyville	510	36.230/88.160	C	0,0
533.	6/11/97	Manleyville	387	36.170/88.180	C	0,0
534.	6/12/97	Bruceton	396	36.120/88.152	C	0,0
535.	6/12/97	Paris	430	36.338/88.300	C	0,0
		[ geophone #30 on small bridge ]				
536.	6/12/97	Paris	480	36.267/88.370	C	0,0
537.	6/12/97	Osage	465	36.298/88.400	C	0,0
538.	6/12/97	Osage	510	36.349/88.468	C	0,0

539.	6/12/97	Como	440	36.365/88.539	C	0,0
540.	6/12/97	Como	355	36.268/88.610	C	0,0
541.	6/12/97			no data - bad disk		
542.	6/12/97	Martin	405	36.260/88.770	C	0,0
543.	6/12/97	Martin	385	36.340/88.830	C	0,0
544.	6/12/97	Greenfield	395	36.230/88.860	C	0
545.	6/12/97	Rutherford	310	36.167/88.917	C	0,0
546.	6/13/97	Greenfield	385	36.163/88.820	C	0,0
547.	6/13/97	Mansfield	460	36.234/88.320	C	0,0
548.	6/13/97	Mansfield	485	36.153/88.300	C	0,0
549.	6/13/97	Vale	415	36.080/88.367	C	0,0
550.	6/13/97	Vale	510	36.020/88.270	C	0,0
551.	7/30/97	McKenzie	460	36.167/88.505	C	4,4 m
552.	7/30/97	Henry	540	36.167/88.436	C	4,4 m
553.	Oct. '97	Germantown	300	35.042/89.796	B	20,400,20,400
554.	Oct. '97	Ellendale	300	35.248/89.766	B	20,400,20,400
555.	2/27/98	Lane	280	36.182/89.307	B	20,320,20,320
556.	2/27/98	Newbern	283	36.052/89.320	B	20,320,20,320
557.	2/28/98	Caruthers-ville SE	280	36.063/89.503	B	20,320,20,320
558.	2/28/98	Dyersburg	270	36.029/89.483	B	20,320,20,320
559.	2/27/98	Miston	272	36.158/89.459	B	20,320,20,320
560.	2/27/98	Lane	300	36.205/89.366	B	20,320,20,320
561.	6/19/98	Arlington	270	35.321/89.667	C	20,CL,20
562.	6/19/98	Gallaway	295	35.322/89.551	C	20,CL,20
563.	7/14/98	Dyer	326	36.104/88.970	C	20,CL,20
564.	7/14/98	Dyer	353	36.042/88.881	C	20,CL,20
565.	7/14/98	Trenton	372	35.938/88.958	C	CL,20
566.	7/14/98	Humboldt	340	35.796/88.945	C	20,CL,20
567.	7/15/98	Adair	390	35.627/88.948	C	20,CL,20
568.	7/15/98	Westover	480	35.536/88.939	C	20,CL,20
569.	7/15/98	Lexington	500	35.735/88.377	C	20,20,480
570.	8/06/98	Bonicord	280	35.921/89.329	B	0,96,0,96,192 m
571.	10/2/98	Denmark	410	35.592/89.040	B	0,400,0,400
572.	10/2/98	Denmark	340	35.505/89.110	B	0,400,0,400
573.	10/2/98	Sunnyhill	320	35.544/89.183	B	0,400,0,400
574.	10/2/98	Brownsville	370	35.537/89.343	B	0,400,0,400
575.	10/2/98	Brownsville	350	35.532/89.343	B	0,400,0,400
576.	10/2/98	Turnpike	300	35.579/89.467	B	0,400,0,400
577.	10/2/98	Gift	280	35.539/89.545	B	0,400,0,400
578.	10/2/98	Gift	270	35.591/89.582	B	0,400,0,400
579.	10/3/98	Ripley S.	300	35.683/89.555	B	0,400,0,400
580.	10/3/98	Ripley N.	350	35.785/89.504	B	0,400,0,400
581.	10/3/98	Ripley N.	250	35.857/89.592	B	0,400,0,400
582.	10/3/98	Fowlkes	290	35.906/89.405	B	0,400,0,400

\* Sites 583 through 587 were recorded on a 12-channel Bison with a geophone spacing of 10 ft for Sites 583 and 584, and 20 ft for sites 585, 586, and 587. The geophone/shotpoint geometries were similar to those given for Array B, but there were only 12 geophones.

583.	7/15/98	Middlesburg	500	35.185/89.063	{20,140,200,320,400,520}
584.	7/15/98	Middlesburg	550	35.127/89.118	{20,140,200,320,400,520}
585.	8/19/98	Hickory Valley	540	35.209/89.193	{20,140,200,320,400,520}
586.	8/19/98	Sommerville	380	35.197/89.316	{20,200,400}
587.	8/19/98	Macon	400	35.242/89.417	20 {20,200,400}
588.	10/8/98	Bells	330	35.730/89.109 B	0,400,0,400
589.	10/8/98	Maury City	330	35.847/89.238 B	0,0,400
590.	10/9/98	Stanton	298	35.440/89.384 B	0,400,0,400
591.	10/9/98	Lambert	358	35.321/89.417 B	0,400,0,400
592.	10/9/98	Hillville	355	35.430/89.165 B	0,0,400
593.	10/9/98	Whitville	520	35.311/89.161 B	0,400,0,400
594.	10/9/98	Hebron	423	35.146/88.952 B	0,400,0,400
595.	10/9/98	Bolivar East	493	35.336/88.930 B	0,0,400
596.	10/9/98	Teague	375	35.417/88.918 B	0,0,400

TABLE III.2

V<sub>s</sub><sup>3</sup> AT SITES INVESTIGATED

TOPO	Site Number	V <sub>s</sub>
Adair	567	915
Arlington	561	847
Bells	588	964
Bolivar East	593	1060
Bonicord	570	695
Brownsville	574,575	1344,1185
Bruceton	534	1011
Caruthersville SE	557	725
Cottage Grove	515	not estimated
Clayton	501,502	610,853
Como	539,540	1075,814
Denmark	571,572	1293,1140
Dresden	517	999
Dyer	563,564	836,940
Dyersburg	558	747
Ellendale	554	669
Fowlker	582	667
Gallaway	562	930

Germantown	553	640
Gift	577,578	847,679
Harris	506,507	1173,983
Hebron	594	1001
Henry	552	919
Hickory Valley	585	1126
Hillville	592	971
Humboldt	566	1130
Gardner	522,523	923,723
Greenfield	544,546	831,1093
Kenton	527,528	751,631
Lane	555,560	672,697
Lambert	591	956
Latham	511,512	1134,1107
Lexington	569	1094
Macon	587	1117
Manleyville	532,533	991,897
Martin	542,543	918,879
Mansfield	547,548	966,1410
Maury City	589	802
McConnell	509,510	983,786
McKenzie	552	919
Middleburg	583,584	1043,1121
Miston	503,559	614,773
Newbern	556	629
Obion	518,519	1138,784
Osage	537,538	1119,981
Palmersville	513	867
Paris	535,536	964,1173
Puryear	514	1108
Ridgely	504	707
Ripley North	580,581	705,741
Ripley South	579	840
Rives	520,521	644,773
Rutherford	524,545	743,707
Somerville	586	973
Stanton	590	863
Sunnyhill	573	1038
Teague	596	849
Trenton	565	1136
Trimble	525,526	950,680
Turnpike	576	1342
Union City	505,508	771,873
Vale	549,550	1254,939
Westover	568	1088
W. Sandy Dike	530,531	961,1243
Whiteville	593	1060

1. Travel times for offsets inside of brackets were spliced together to form composite seismic sections, as described by Street, *et al.* (1995). Offsets are given in the order that they were acquired.
2. The shotpoint and geophone array for site 505 were as follows:

With 24 geophones installed, travel times were collected for shotpoints at sp1 and sp2. The geophones were then moved to so that they were located 260 ft to the left of sp2 in the figure shown below. Travel times for shotpoints 3, 4, and 5 were then collected.

\*-----\*

sp5	sp1	sp2
	sp4	sp3

3.  $V_s$  is the weighted shear-wave velocity of the upper 100 ft (30 m) of the site profile. The weighted shear-wave velocity is calculated in accordance with equation 4.1.2.3-1 (pg. 35) of the 1997 edition of the NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures. Shear-wave velocities are given in ft/s. To convert velocities to m/s, multiply by 0.3048.

TABLE III.3

Site No.	Depth to interface (ft)/SH-wave velocity (ft/s) <sup>1</sup> (1 ft = 0.3048 m)					
501	78	160				
	519	1594	1837			
502	43	74				
	498	1825	1864			
503	24	110	305			
	515	654	1270	2299		
504	28	92	265			
	461	863	1222	2105		
505	28	75		29	56	
	521	988	2121	610	1250	1609
	7	80		17	103	189
	263	654	1466	519	672	1789
506	26	137		30	138	
	966	1280	1433	955	1288	1467
507	61	89	290	6	106	210
	296	714	993	2707	351	724
508	25	168		19	52	87
	494	1155	1491	541	873	1156
509	25	87		17	75	
	776	1000	1719	787	922	1465
510	51	273		34	268	

	525	1225	3684		571	1119	3444		
511	51	214			46	177			
	1064	1268	2081		958	1289	1839		
512	41				41				
	698	1876			688	1905			
513	11	168	300		51	142	291		
	563	1023	2007	2883	547	1508	1926	2791	
514	20	73	284		18				
	901	979	1305	2564	1030	1225			
516	53	162			56	73	148		
	974	1451	1810		1026	1423	1449	1750	
517	39				50				
	522	2081			688	2092			
518	23	59							
	618	1874							
519	47	206							
	548	1270	1629						
520	23	64	157	259	25	85	223		
	423	782	918	1115	1658	334	784	1043	1622
521	23	73	200			34	94	211	
	548	741	1196	1569		693	836	1186	1546
522	20	134				27	190		
	635	1033	1304			698	1059	1561	
523	24	81				19	86		
	483	762	1413			366	845	1418	
524	31	87				40	176		
	458	1044	1170			515	1014	1461	
525	17					30	216		
	553	1110				686	1143	1690	
526	17	61	143			23	59	143	
	434	710	915	1305		481	737	909	1288
527	35	126	232			47	99	242	
	672	778	1067	1600		699	830	1040	1556
528	107	331				98	334		
	629	1449	1970			632	1390	2270	
530	28	84	276			32	91	304	
	651	1278	1534	6486		532	1270	1684	10141
531	95					78			
	1204	1761				1205	1590		
532	177					9	181		
	978	8182				678	1054	8128	
533	24	145				23			
	301	1401	11282			643	1290		
534	7	36	112			6	39	107	
	320	956	1364	11746		370	800	1481	11128
535	7	84				16	95		
	444	1104	2119			275	1383	2471	
536	6	77				7	62		
	440	1061	2657			385	1121	2638	
537	198					207			

	1162	2039			1075	2353	
538	34	146			37	107	
	828	1095	1478		795	1125	1481
539	52	133			36	214	
	945	1302	1897		950	1136	2927
540	26	38			25	52	
	403	1019	1295		427	950	1389
542	32	132			18	130	
	529	1229	1486		563	1155	1457
543	25	147			65	143	
	645	1098	1806		674	1393	1796
544	7	144	257				
	280	975	1589	2074			
545	25	172			30	180	
	424	939	2049		440	916	1894
546	8				22		
	303	1296			869	1276	
547	88				81		
	858	2286			898	2037	
548	27	68			61	70	
	1129	1511	1656		1255	1569	1760
549	14	50			22	37	
	513	1481	1965		519	1778	1968
550	116	315			103	271	
	871	1760	3175		1000	1637	2177
551	15	39			8	37	
	296	375	513		224	298	598
552	4	27	55		10	34	
	206	277	381	653	237	306	441
553	65	165			41	87	
	562	866	1429		514	725	984
554	28	88	228		32	80	193
	595	678	1118	1714	593	730	1006
555	36	78	100		51	84	
	539	727	938	1039	536	845	1011
556	46	253			46	245	
	414	1097	2083		426	1090	1630
557	142				114		
	729	1379			724	1404	
558	21	57	94	348			
	625	667	920	1053	1333	55	78
559	26	78	102	200		964	1025
	556	684	897	986	1333	29	82
560	15	95	179			178	
	568	678	1157	1310		533	700
561	42	177				921	1287
	664	1112	1614			20	83
562	3	45	157			149	
	625	774	1134	1574		541	738
	38	87				1037	1422
					41	191	
					602	1114	1700
					15	48	
					781	860	1116

	717	1067	1506					
563	40	176		43	178			
	695	996	2023	675	987	1978		
564	34	138		32	115			
	849	1077	1294	758	974	1376		
565	23	189						
	909	1227	2113					
566	42	168		23	184			
	865	1361	1678	982	1230	1739		
567	51	184		43	177			
	780	1129	2057	675	1237	1910		
568	88			130				
	1124	1415		1024	1550			
569	30	109		32	96	277		
	933	1161	1778	976	1161	1569	2016	
* data for Site 570 were acquired with 4-meter takeout lines								
570	5.9	9.7	20.5	5.1	10.8	20.5	71.4	
	127	209	222	287.5	133	190	225	288
571	13	58	81		12	44		
	541	1359	1585	1709	635	1366	2051	
572	6	35	51	186	7	28	173	
	555	1071	1294	1385	2029	328	1250	1390
573	22	63			18	72		
	699	1021	1540		795	952	1586	
574	38				37			
	1111	1479			1075	1645		
575	13	203			11	46		
	556	1350	1643		678	1329	1394	
576	22	318			13			
	762	1456	2933		541	1978		
577	29	53	169		36	58	234	
	633	889	1198	1757	482	1031	1463	1705
578	44	120	216		39	79	182	
	494	899	1098	1379	519	833	1020	1370
579	9	69	172		5	41	154	
	555	805	1102	1513	606	690	1004	1456
580	11	69	256		12	72	130	
	356	648	1420	1729	317	720	1379	1649
581	16	47	104		10	45	120	
	541	671	881	1277	571	642	889	1333
582	61	208			56	195		
	571	912	1864		543	923	1839	
583	67				83			
	1092	1470			1057	1622		
584	10				5	17	108	
	451	1301			533	980	1265	1616
585	46	134			38	138		
	924	1319	1799		1067	1309	1692	
586	18	65	165					
	643	983	1296	2432				

587	5	53	124					
	580	1075	1296	1739				
588	69	178			69	206		
	928	1250	1707		807	1324	1974	
589	13	43			7	45	144	
	513	761	953		612	676	963	1825
590	85							
	800	1563						
591	18	99	190		17	101	205	
	526	1116	1633	2115	566	1155	1538	2222
592	51				46	70	349	
	808	1158			797	1143	1237	2115
593	9	36	205					
	645	979	1212	1961				
594	5	91			21	96		
	431	1017	2025		763	1075	2025	
595	44				20	108		
	1020	1190			1038	1106	2190	
596	33	95			16			
	381	2114	2791		348	1667		

1. The first line of numbers for each site indicates the depths to interfaces in the soil column, the second line of numbers indicates the shear-wave velocities of the soil layers. For example, at site 506 a reversed refraction profile was acquired. From the left-hand set of numbers, interfaces were interpreted at 26 and 137 ft, respectively, and the shear-wave velocities of the soil layers were interpreted as being 966, 1280, and 1433 ft/s, respectively.